**Alberta Assessment Consortium**

**Grade 5 Mathematics**

**Performance Assessment Task: Teacher Resource Materials**

**The Petting Zoo**

**CONTEXT FOR LEARNING**

Students have been hired by a nearby town to plan a petting zoo for a community park. The town council has purchased fencing for three different enclosures. Students will create a layout for the zoo, with three rectangular enclosures, and will determine the number of animals that could be placed in each.

This task provides opportunities for students to design and construct different rectangles, given a fixed perimeter, and to consider the effect of the dimensions of a rectangle on the area. By justifying their choice of which animals to place in which enclosure, they will be making generalizations about the relationship between perimeter and area for different rectangles. As they determine the maximum number of animals for each enclosure, they will be have an opportunity to demonstrate an understanding of multiplication, use mental math strategies to solve a problem, share their strategies, defend their solutions and refine their ability to communicate and reason mathematically (see Program of Studies, 2007, p. 4).

**Teacher Resource Materials include:**

* Learner Outcomes and Assessment Criteria (p. 2)
* For Best Results (pp. 3, 4)
* First Steps Student Support (p. 5)

**Student Materials include:**

* Student Task (p. 1)
* Checklist and Rubric (p. 2)
* Student Worksheets (pp. 3-4)

**Assessment for Learning Tools:**

* Coaching Feedback
* Student Self-reflection



Teachers may modify these materials in response to the specific learning needs of their students. Please visit [www.aac.ab.ca](http://www.aac.ab.ca) for the most recent AAC version of these materials.

**ASSESSMENT AND EVALUATION OF STUDENT LEARNING**

This performance task addresses the following learner outcomes (shown in Times New Roman font) from the Mathematics Program of Studies:

**NOTE:** Where text is grey, that portion of the outcome is not specifically addressed in this task.

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| **Grade Five Learner Outcomes** | **Criteria for Evaluation\***  Students provide evidence of their learning as they: |
| Shape and Space (Measurement) General Outcome: **Use direct and indirect measurement to solve problems.** | |
| 2. Design and construct different rectangles, given either perimeter or area, or both (whole numbers), and make generalizations.  [C, CN, PS, R, V] | * design rectangles * make generalizations |
| Number General Outcome: **Develop number sense.** | |
| 4. Apply mental math strategies for multiplication, such as:   * annexing then adding zero * halving and doubling * using distributive property.   [C, CN, ME, R, V] | * apply multiplication strategies |

\* Criteria statements appear again in the first column of the evaluation tools (checklists, rating scales and/or rubrics) and are the basis on which student evaluation is made relative to the learner outcomes.

**Mathematical Processes**

Mathematical processes are skills that are addressed at all grade levels. They are not taught as discrete skills, but are integrated into the specific outcomes. Links to the processes are identified within square brackets after the specific outcomes.

Throughout this task, the following mathematical processes are specifically addressed:

* Communication: communicate in order to clarify, reinforce and modify ideas.
* Connections: connect mathematical ideas to each other or to the real world.
* Problem Solving: develop and apply new mathematical knowledge through problem solving.
* Reasoning: use reasoning skills to analyze a problem, reach a conclusion and justify or defend that conclusion.
* Visualization: be able to create, interpret and describe a visual representation.

**FOR BEST RESULTS**

This section provides suggestions for **additional instruction** and **assessment for learning support.** A student self-reflection tool and a peer-coaching tool have been provided in this package. These tools are **not** intended to be used for grading purposes, but rather to scaffold students along the way to successful completion of the performance task. As not all students will require the same type and/or amount of scaffolding, teachers make instructional and coaching decisions based on student needs.

After initial suggestions on preparing for the task, the information in this section is organized around the criteria for evaluation. Thus, teachers can target the areas where they feel students require additional support and guidance.

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| To help **prepare students for the task…** |

* Share the context, using the notebook file if desired. Clarify vocabulary if necessary. Clarify the specifications from the town council: 3 to 5 *different* rectangular animal enclosures, each using 40 m of fencing. Reinforce the idea that a 3m x 2m rectangle will be considered the same as a 2m x 3m rectangle in this task.
* Provide an extra copy of the Zoo Plan grid (student Materials, p. 4) for rough work as the students begin the task. For their finished plans to submit to the council, it is recommended you print this page side-by-side with Student Materials p. 3 (a summary of the plan) on 11”x17” paper.
* If you plan to include the challenge activity (researching to determine the cost of animals for the zoo) as part of the task, provide access to technology.

**Differentiation notes:** Be prepared to differentiate the task (for example, by reducing the amount of fencing for each enclosure, and/or requiring only two different rectangles) or providing concrete materials to represent fence sections (e.g. segments of drinking straws, threaded onto string if desired). You may need to provide additional coaching and scaffolding for students who are not yet ready to complete this task independently.

**Combined Grade classrooms:** This task is easily adaptable for use by students in Grades 4 and 6. For Grade 4 students, you may wish to give them a fixed area (for example, 48 m2) rather than a fixed perimeter to use in the task, or simply remove the “40 m of fencing” restraint altogether and allow them to design rectangles of any size. Grade 6 students are expected to develop and apply formulae for area and perimeter, so you could make it an expectation that they use these formulae in their work.

**Assessment for Learning Support**

* Share the assessment task, criteria and rubric with students at the beginning of the activity to help focus their learning during the unit of study.
* Exemplars are a powerful way to help students understand the expected standard of performance by viewing work at a variety of levels of proficiency. Check the AAC website ([www.aac.ab.ca](http://www.aac.ab.ca)), where student exemplars will be posted as they are available.

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| To help students **design rectangles** with a given perimeter **(criterion #1)** |

* Give students opportunities to estimate the perimeter and area of a variety of rectangles, as well as other shapes. Estimation helps build an understanding of the attribute being measured, which is critical when it comes to perimeter and area, as students often confuse these. Estimation will also help students begin to appreciate how quickly area grows compared to increases in perimeter. A centimetre grid overlay is useful for confirming area.
* Give students opportunities to build rectangles using a fixed number of toothpicks or short segments of drinking straws. The drinking straws may be threaded onto string to make it easier to experiment with different rectangles with the same perimeter.

**FOR BEST RESULTS (continued)**

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| To help students **make generalizations** about the perimeter and area of rectangles **(criterion #2)** |

* Allow students to explore the patterns to be found when building and comparing different rectangles with the same perimeter. How are width and length related? What happens to area as one dimension increases and the other decreases?
* Provide students with the area and perimeter measurements for a “mystery” rectangle, and challenge them to draw a rectangle to match. Is it possible to have more than one rectangle to match the specifications?
* Build an understanding with your students of what “mathematical reasoning” might look or sound like. Discuss what mathematical reasons might influence their choice of animals for each enclosure. Students might refer to differences in area, cost of specific animals, and/or length of enclosures.

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| To help students **apply multiplication strategies (criterion #3)** |

* Students may use a variety of strategies to determine the number of animals that could fit in each enclosure. Encourage students to share strategies with a partner or the class when solving problems involving multiplication or division situations.
* Help your students develop an understanding of multiplying and dividing using 10 and 100, both by using place value concepts (5x30 is 5 groups of 3 tens or 15 tens) as well as exploring patterns (5x3=15, 5x30=150, 5x300=1500).
* Use estimation at the beginning of any problem-solving activity. “Do you think the answer will be more or less than \_\_\_\_? How do you know? Will the answer be closer to \_\_\_\_ or \_\_\_\_? How do you know? Can you give me an answer you know will be too big? Too small? About right?”
* When students choose to use very simplistic and inefficient methods for multiplying and dividing (e.g. tally marks, counting one-by-one on a hundred chart or area model, counting on with fingers), encourage them to use facts they know as a starting point (e.g. using 5x7 as a starting point for 6x7).

**Assessment for Learning Support**

You may choose to use the Coaching Feedback tool or Student Self-Reflection tool to help your students focus on the criteria for this task and to involve them in the feedback process. In both cases, be prepared to change the questions if you feel there are other areas for reflection that would be more helpful to your students.

**Note:** Allow time for students to make adjustments to their work based on the feedback and reflection **before** submitting it for evaluation.

**Coaching Feedback Tool (Assessment for Learning Tools)**

* This is an opportunity for oral conversation and feedback from either a peer or the teacher. Students will discuss criteria with their coach to help clarify thinking.
* Students will be asked to evaluate the feedback they received, and use the feedback to improve their work in some way.

**Student Self-reflection (Assessment for Learning Tools)**

* This gives students an opportunity to reflect on the criteria and how successful they’ve been on meeting them.

**First Steps (p. 5 of this document)**

* This document provides a starting point for students who are not yet ready to complete the task independently.

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_

First you will need to find one rectangle with a perimeter of 40 m. (Remember: a square is a rectangle, too!)

* Sketch that rectangle on your grid paper.
* Record the length and width here:

Length \_\_\_\_\_\_\_\_\_ m Width \_\_\_\_\_\_\_\_\_ m

What happens to the perimeter of this rectangle if you increase the length by 1 m?

What could you do to the width of this longer rectangle, to come up with a new rectangle that still has a perimeter of only 40 m?

Next steps:

* See if you can find one or two more rectangles with a perimeter of 40 cm.
* Now you’re ready to create a zoo plan using these rectangles, and choose animals for each area.